

NOTES ON PARASITES—27 AND 28.

BY CH. WARDELL STILES, A. M., PH. D.

27: *Experimental Trichinosis in* *Spermophilus 13-lineatus*.[Appears simultaneously in THE VETERINARY MAGAZINE and in the C. f. B. u. P., 1894,
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During a series of investigations upon trichinosis, undertaken in the States of Iowa and Nebraska this past summer under instructions from the Honorable Secretary of Agriculture, I had occasion to examine some of the smaller animals of those States, as well as to carry on certain experiments upon them.

In the 13-striped spermophile (*Spermophilus 13-lineatus*) I found an animal which, although generally supposed by the laity to be only a pure vegetarian, is in reality a true cannibal also, and which on that account seemed to promise results of practical importance in connection with the subject of trichinosis. I therefore infected a number of spermophiles with *Trichina spiralis* and found that they formed a most excellent host for the development of this parasite. In none of the spermophiles which I caught in the fields and examined, however, did I find any of the parasites in question, and I am therefore inclined to look upon the spermophiles as an unimportant factor (like the rabbits, for instance) in connection with this disease.

The results of my studies on American trichinosis—which I reduce entirely to a hygienic basis, taking hogs and rats as the chief hosts—will be published later by the Bureau of Animal Industry. I will mention here only one point in connection with the matter, *i. e.*, that the European authors who state that it is customary for the Chicago, Omaha and other large American porkpackers to feed offal to swine at their abattoirs and spread the disease in that way are entirely in error. This custom of offal-feeding does exist among small local country butchers, but I have yet to find any of the packers who ship pork to Europe, feeding offal at their abattoirs. It is, in fact, rare that hogs are allowed to remain over forty-eight hours in



the stockyards of any packing-house before being slaughtered, and during this time they are fed on grain. This delay of 24-48 hours is, of course, necessary to allow the hogs to recover from their journey on the cars, but in no way does it render them more trichinous, as the muscular stage of the disease could not develop in so short a time, even if they became infested with the parasites after reaching the yards. In packing-houses all scraps of meat, etc., are used in one way or another (as fertilizer, etc.) so that there is not the slightest possible chance for hogs to become infected from this source. In fact, it is a saying among pork-packers that the only part of the hog which goes to waste is the "squeal!"

B. A. I., U. S. Dept. of Agriculture. October 1, 1894.

28: *New American Finds of Sarcosporidia.*

The following undetermined species of Sarcosporidia have recently come into my possession for determination:

1. An extremely delicate *Miescheria* has been found in the heart muscle-cells of cattle by various members of the Bureau of Animal Industry force, more particularly by Dr. Theobald Smith. This form is extremely common in this locality, being present in almost every animal examined. The older an animal, the more heavily infested it is and the larger the parasites are, so that it is possible to estimate approximately the age of the animal by the appearance of the Sarcosporidia.

2. Dr. Henry Shimer, of Mount Carroll, Ill., has forwarded an undetermined Sarcosporidium from wild rabbits; Hassall has found Sarcosporidia in *Lepus sylvaticus* in Maryland.

3. While in Iowa this summer I found an undetermined species of intra-muscular Sarcosporidium very common among rats. In some localities fully seventy-five per cent of the rats were infested.

4. Hassall has quite recently found a *Balbiana* in *Setophaga ruticilla* (American Red-Start).

5. In my Notes on Parasites-18, I mentioned that our Bureau Artist, Mr. Haines, had several times noticed a peculiar condition in Maryland chickens which he thought was similar to the condition in ducks known as "measles." Several days ago Dr. V. A. Moore placed at my disposal, that I might examine it for animal parasites, the body of a chicken which had died

in one of his experiments. Throughout the muscles of the breast and legs I noticed fine whitish specks, which, upon microscopic examination proved to be very delicate intramuscular Sarcosporidia.

All of these finds will be determined and reported on in detail as soon as other work will allow.

B. A. I., U. S. Dept. of Agriculture. November 17, 1894.

NOTES ON PARASITES—29 AND 30.

BY CH. WARDELL STILES AND ALBERT HASSALL.

29: *A new species of intestinal fluke (Distoma tricolor) in the Cotton-tail Rabbit (Lepus sylvaticus Bachman) and in the Northern Hare (L. americanus Erxleben.)*

[Plates I and II.]

One of the bottles (Rack 10A.) of the Bureau of Animal Industry collection of parasites contains some very small flukes collected by Cooper Curtice, and bearing the label "1887, wild-rabbit." Curtice found the same parasites a second time and placed them in the Bureau of Animal Industry collection with the label "*Monostomum (?)* sp. undt." These are the forms mentioned under this name by Curtice¹ for *Lepus americanus*. Hassall found these same parasites in the Cotton-tail in 1891, and since that time he has collected them from nearly every rabbit he has opened. They occur in the small intestine in large numbers at all seasons of the year and have very much the appearance of small seeds fed to canary birds.

Immediately upon opening a rabbit, these parasites may be seen as small whitish specks, showing through the intestinal wall.

As we have been unable to identify this parasite with any known form of which we have recorded, we believe it represents a new species.

General external appearance.—The parasites are small, more or less elliptical in outline, 0.65–1.2 mm. long by 0.35–0.64

¹ Cooper Curtice—Parasites, being a list of those infesting domesticated animals and Man in the United States; Jour. Comp. Med. and Vet. Arch. 1892, pp. 223-236, vide. p. 232.

(0.8 in one pressed preparation) broad by 0.32 mm. thick, appearing nearly round on transverse section. The fresh specimens present three distinct shades (hence the specific name *tricolor*); the portion occupied by the uterus stands out prominently as yellow to brown; the portion occupied by the vitellaria as white, while the remainder of the body appears gray. In old specimens in which the uterus has reached its full development the anterior half of the body is dark-yellow or brown (Plate I, Fig. 2), and it is impossible in these cases to distinguish the internal anatomy or the acetabulum. It is probable that Curtice had specimens of this kind before him when he determined them as "*Monostomum* (?)."

The anterior two-thirds of the body is thickly beset with minute ($5\ \mu$ long) spines, which, however, frequently fall, and hence are seen on comparatively few specimens. The oral sucker is terminal or sub-terminal, according to contraction, is directed ventrad and measures $88-112\ \mu$ in diameter. The acetabulum is situated on about the border of the first and second anterior fourths of the body, 0.32 mm. from the oral sucker; it is slightly smaller than the oral sucker, measuring $72-100\ \mu$ in diameter. All of these measurements were made on mounted specimens.

The genital pore is generally about half way between acetabulum and aboral extremity (0.4 mm. posterior of the acetabulum in one specimen); the cirrus on the right, the vulva on the left.

Digestive tract.—The anterior portion of the intestinal tract can be seen best on fresh material. A muscular pharyngeal bulb about $36-40\ \mu$ in diameter follows the oral cavity, and is itself followed by an œsophagus, which measures from $30-40\ \mu$ in length. The œsophagus then branches into the two crura intestini which take a very irregular course, varying greatly in different specimens, and extend to the posterior extremity of the body (Plate I, Fig. 1).

Male genital organs.—The testicles are never on the same transverse plane; one of them—invariably the right testicle in the thirty or more preparations examined—lies in the median line near the posterior end of the body; the left testicle lies some distance anterior to this, in the lateral portion of the worm, immediately ventrally of the left intestinal sac; the testicles are large, measuring 160 to $272\ \mu$ in diameter, and are

round or oval according to the state of contraction of the worm; lobing was not noticed in a single case. The separate vasa deferentia could be distinguished in only one specimen; the common vas deferens, however, was distinctly seen in several specimens; it was median of the left testicle, ran cephalad a short distance, turned and extended caudad across the median line communicating with the ductus ejaculatorius, and in its entire extent (so far as visible) it is occasionally swollen into a seminal reservoir by the presence of numerous spermatozoa. The cirrus-pouch is bottle-shaped, varying somewhat in outline; it measures 160–200 μ long by 80–120 μ wide in its broadest part; the penis is large in proportion to the size of the animal, measuring when fully extruded 80 μ long by 32 μ broad. As stated above, the male opening is post-acetabular, slightly to the right of the median line.

Female genital organs.—The ovary is much smaller than the testicles, round or oval, 80–120 μ in diameter, and is situated on the right of the body immediately ventral of the right intestinal sac; from the dorsal surface of the ovary a small short oviduct (seen only in one specimen, observation therefore needs confirmation) runs toward the middle of the shell-gland and here meets with the vitello-duct, uterus and Laurer's canal, in relations which could not be made out with certainty, either upon sections or in press-preparations. The shell-gland is about one-half to two-thirds as large as the ovary, and is situated slightly nearer the median line. The vitellogene glands are subject to extreme variation. They are located laterally, occupying in some specimens only the middle third of the sides, in other specimens (Plate I, Figs. 1 and 3) extending anteriorly almost to the oral sucker; they may be symmetrically (Plate I, Fig. 3) or asymmetrically developed. The vitello-ducts run caudad, one from each set of vitellogene glands; the left duct crosses the left testicle and the end portion of the uterus ventrally; the right duct crosses the beginning portion of the uterus, and the shell-gland ventrally; the two ducts meet in (Plate I, Fig. 3, Plate II, Fig. 5), or near (Plate I, Fig. 1) the median line at about the upper border of the right testicle, they here form a triangular vitello-reservoir which runs dorsally (Plate II, Fig. 5), the end curving around to the right and apparently entering the shell-gland. Laurer's canal was extremely indistinct; it

could not be seen at all on press-preparations; in two series of transverse sections, however, a delicate string of cells, surrounding a lumen could be followed running dorsally from the shell-gland a short distance; then it was lost to view, but another string of cells with surrounded canal could be distinguished extending from a depression in the dorso-median line a slight distance ventrally, then turning to the right; this imperfectly seen canal is interpreted as Laurer's canal. The uterus begins at the middle of the shell-gland (Plate I, Fig. 1) and runs cephalad in irregular loops on the right-hand side of the worm; it then returns around the left side of the acetabulum and cirrus-pouch, running dorsally of the end portion of the vas deferens, ventrally of the left intestinal sac and dorsally of the left vitello-duct, to the vulva which, as stated above, is situated at the left of the male opening; a striking feature in all specimens examined is that the metatrem¹ always runs as a dark-brown line in a given direction, *i. e.*, from the median line toward the left. This gives us an excellent character by which we can determine with the naked eye dorsal, ventral, right and left, even without hunting for the acetabulum.

Copulation.—The question as to the method of copulation among distomes has given rise to quite a discussion. Without entering into the details of this discussion it may be stated briefly, for information of those who have not followed the question, that three different views² in particular in regard to the sexual act among flukes have been supported by various scientists. Some authors believe that the metatrem functions as vagina, and that a cross-fertilization takes place; others support the view that flukes fertilized themselves through the metatrem; still others look upon the Laurer's canal as the true vagina.

It is now quite generally admitted, however, that the Laurer's canal is not used in copulation. Cross-copulation has, according to Braun, been observed by Nitzsch (1819) in *Holostomum serpens*, by Miescher (1838) in *Monostomum faba* Brems., by

¹ H. B. Ward has recently proposed the term *metatrem* for the end portion of the uterus, *i. e.*, for the portion usually named the vagina. (On the Parasites of the Lake Fish. I: Notes on the Structure and Life-History of *Distoma opacum*, n. sp.; Proc. Amer. Micr. Soc., 1894, Vol. XV, pp. 173-182.)

² For a detailed account see Braun's *Vermes*, pp. 745-746, and Looss' *Die Distomen unserer Fische und Frösche*, 1894, pp. 226-235.

Looss (1885) in *D. clavigerum* Rud. ex parte (according to Looss = *D. confusum*), by v. Linstow in *D. cylindraceum* Zed. To this list should now be added the cross-copulation observed by Ward (1894) in *D. opacum*, by Noack in *D. clavigerum*, and the cases (*D. confusum*) mentioned recently by Looss (1894). Self-copulation has, according to Braun, been observed in *D. cirrigerum* v. Baer by Zaddach (1881). To this and to Looss' recent observations (*D. echinatum*) we are now able to add another case. Hassall has this day (XI. 17, 1894) found a large number of specimens of *D. tricolor* in a rabbit, and among these we found four specimens in which self-copulation was taking place. All of the specimens were adult, and the ~~uteri~~ ^{four} of all ~~these~~ were well filled with ova; the cirrus was extruded from the cirrus-pouch and curved around toward the metatrem like a hunter's horn, the end portion of it entering the metatrem (Pl. II, Fig. 8).

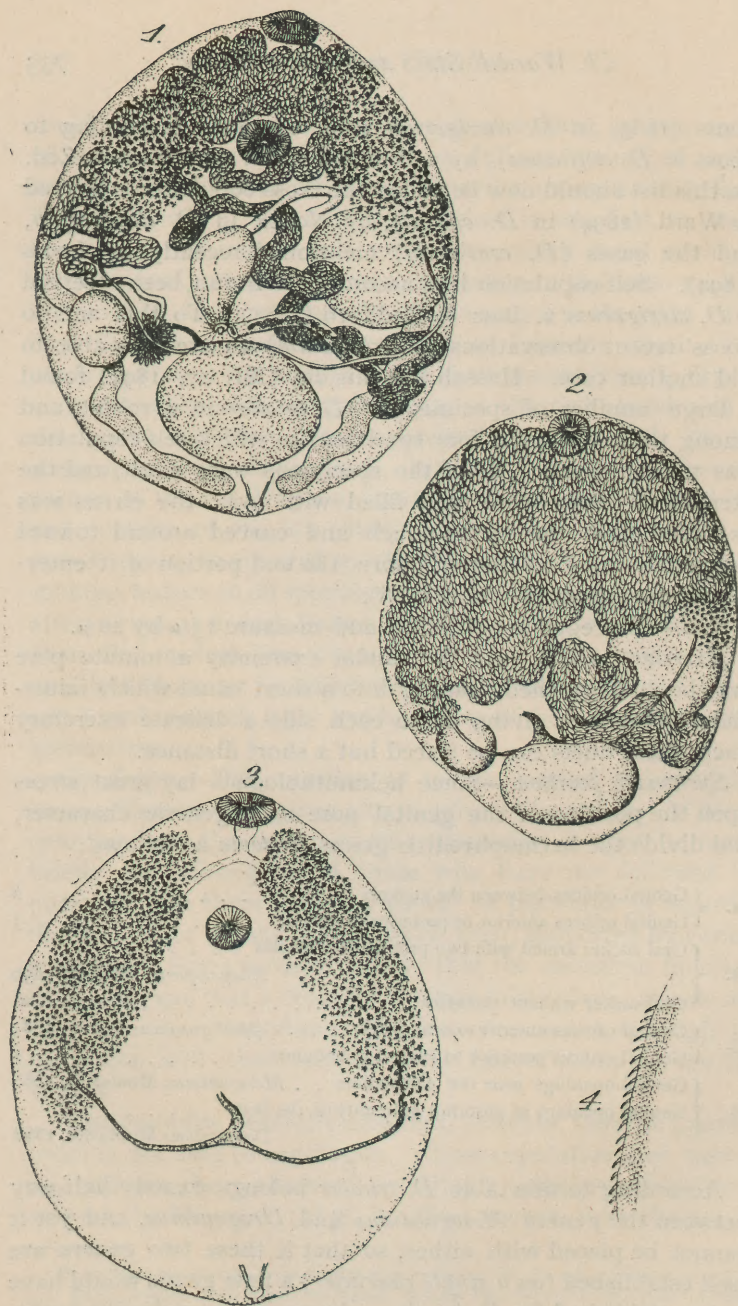
Ova.—The eggs are elliptical and measure $13\ \mu$ by $20\ \mu$.

Excretory system.—At the caudal extremity a minute pore may be distinguished, leading into a short canal which immediately branches, giving off to each side a delicate excretory duct; these ducts can be traced but a short distance.

Systematic position.—Some helminthologists lay great stress upon the position of the genital pore as a generic character, and divide the hermaphroditic genus *Distoma* as follows:

1.	{	Genital orifices between the suckers	2
	{	Genital orifices anterior or posterior to suckers	3
2.	{	Oral sucker armed with two protractile tentacles	<i>Rhopaloporus</i> Diesing, 1850
	{	Oral sucker without tentacles	<i>Distoma</i> s. st.
3.	{	Genital orifices anterior to oral sucker	<i>Cephalogonimus</i> Poirier, 1885
	{	Genital orifices posterior to ventral acetabulum	4
4.	{	Genital openings near the acetabulum	<i>Mesogonimus</i> Monticelli, 1888
	{	Genital openings at posterior extremity of the body	<i>Urogonimus</i> Monticelli, 1888

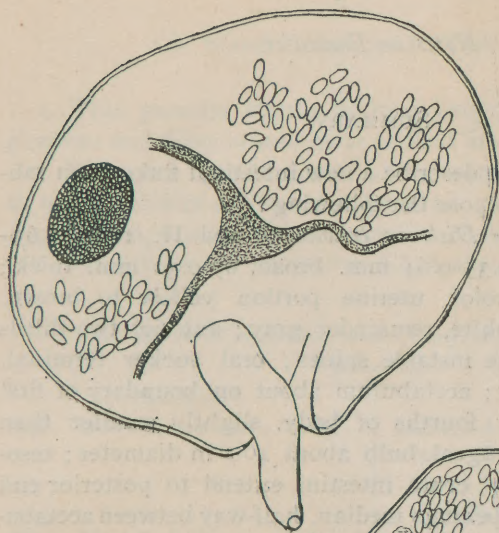
According to this table *D. tricolor* belongs exactly half-way between the genera *Mesogonimus* and *Urogonimus*, and yet it cannot be placed with either, so that if these two genera are well established (on a single character) a new genus would have to be established for *D. tricolor*. As we are exceedingly doubtful as to the present validity of these two genera, we prefer to leave *D. tricolor* in the collective genus *Distoma*.



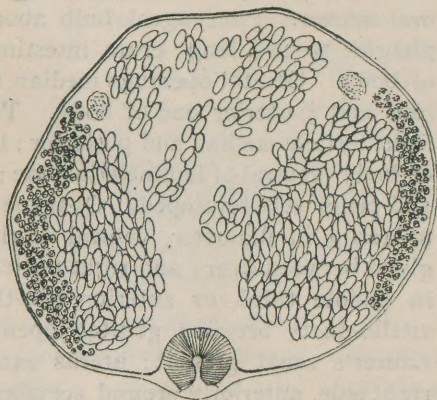
DISTOMA TRICOLOR.

- Fig 1.—Mounted specimen showing almost the entire anatomy; for description, cf. specific diagnosis.
 Fig 2.—Older specimen in which the uterus has reached an enormous development, hiding many of the organs from view.
 Fig 3.—Specimen showing oral sucker, acetabulum, anterior portion of digestive system, vitellogene glands, vitellogene ducts and end portion of excretory canal.
 Fig 4.—Integument, with spines.

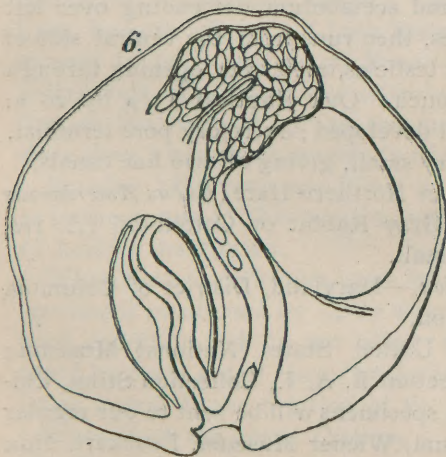
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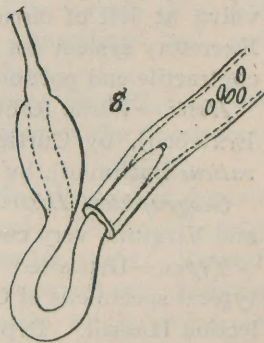
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DISTOMA TRICOLOR.

Fig. 5.—Transverse section through genital pore; on the right of the animal are seen ovary and some eggs lying in the beginning portion of the uterus; on the left eggs in the lower portion of the uterus; vitelloglands in the middle of the body; ventrally the cirrus at the right and metatrem at the left.

Fig. 6.—Transverse section slightly nearer the acetabulum; a portion of the left testicle is visible.

Fig. 7.—Transverse section at the acetabulum; the greater part of the body is occupied by the uterus; vitelloglands at the lateral margins; intestines dorso-median of vitelloglands.

Fig. 8.—Male organ (cirrus) in copulation with female organ (metatrem) of same animal.

SUMMARY.

1. In this paper we describe a new intestinal fluke from rabbits, for which we propose the following:

Specific diagnosis.—*Distoma tricolor* S. and H., 1894⁴, 0.65–1.2 mm. long by 0.35–0.64 mm. broad, by 0.32 mm. thick; body elliptical; tricolor, uterine portion yellow to brown, vitellogene region white, remainder gray; anterior two-thirds covered with minute instable spines; oral sucker terminal, 88–112 μ in diameter; acetabulum about on boundary of first and second anterior fourths of body, slightly smaller than oral sucker. Pharyngeal bulb about 40 μ in diameter; oesophagus, 30–40 μ long; crura intestini extend to posterior end of body. Genital openings median, half-way between acetabulum and posterior end of body. Testicles large (160–272 μ); right testicle median and posterior; left testicle in middle third of body, ventral of left intestinal sac; vas deferens, cirrus-pouch and penis well developed. Ovary much smaller than testicles, 80–120 μ in diameter, ventral of right intestinal sac; shell-gland between ovary and right testicle; vitellaria latero-ventral in middle third, or anterior two-thirds of body; transverse vitello-ducts between genital openings and right testicle; Laurer's canal present; uterus extends from shell-gland on right side, anteriorly around acetabulum, descending over left testicle or between testicles, then runs from the ventral side of left intestinal sac between testicles, metatrem opening through vulva at left of cirrus-pouch. Ova elliptical 13 μ by 20 μ . Excretory system not well developed; excretory pore terminal, contractile end portion very small, giving off two fine canals.

Hosts.—White Rabbits or Northern Hare (*Lepus Americanus* Erxleben), by Curtice; Gray Rabbit or Cotton-tail (*L. sylvaticus* Bachman), by Hassall.

Geographical Distribution.—Maryland, District of Columbia and Virginia, very common.

Types.—Deposited in United States National Museum; typical specimens in Collection B. A. I., Collection Stiles, Collection Hassall. Typical specimens will be sent to our regular exchanges (Berlin Museum, Wiener Museum, Leuckart, Max Braun, R. Blanchard, Railliet, Moniez, Neumann, Zschokke, Parona, Sonsino, Stossich, H. B. Ward and others). Abundance of material on hand for exchange with others.

2. This parasite stands midway between the genera *Mesogonimus* and *Urogonimus* as at present diagnosed.

3. We agree with Braun et al. in being extremely sceptical as to the validity of these two genera.

4. Self-copulation was observed in *D. tricolor*.

B. A. I., U. S. Dept. of Agriculture. XI, 24, 1894.

30: *Distoma (Polyorchis) molle* (Leidy, 1856) S. & H., 1894.

(Plate III.)

Synonymy.	Bibliography.
1856. ? <i>Monostomum molle</i> , Leidy .	LEIDY.—A synopsis of Entozoa and some of their ecto-congeners, observed by the author; Proc. Acad. Nat. Sc. (Phila.), vol. VIII, p. 43.
1892. <i>M. molle</i> , Leidy	BRANDES.—Revision der Monostomiden; C. f. B. u. P. XII, p. 510.
1894a. <i>D. (P.) molle</i>	STILES & HASSALL.—Preliminary Catalogue of Parasites, etc.; Vet. Mag., I, pp. 251 and 253.
1894b. <i>D. (P.) molle</i> seu <i>Polyorchis molle</i>	S. & H.—Notes on Parasites, 21; Vet. Mag., I, p. 414.

In 1856 Leidy described a new parasite as follows:

“? *Monostomum molle*, Leidy.—Body depressed, elongated elliptically, posteriorly convex. Head? mouth? Length 9 lines, breadth 2 lines. I have found two specimens of what I suspect to be a species of *Monostomum*, in the lungs of two individuals of *Sternotherus odoratus*. The species is so soft that in the removal of the specimens I mutilated both, and since then I have been unable to find others.”

Brandes (1892) was unwilling to express himself definitely as to the nature of this parasite, on account of the meagreness of Leidy's description.

When Leidy's collection came into Stiles' possession, the two specimens mentioned by Leidy were found. They are in very poor condition and do not allow a careful study. Enough could be made out of them, however, to warrant our changing (1894 a and b) the position of the species to the subgenus ¹*Polyorchis* of the genus *Distoma*.

¹ In the footnote (1894 b, p. 414) we were lead into the error of stating that Stossich had raised his subgenus *Polyorchis* to generic rank. This was based upon a misinterpretation of a statement by another author in referring to one of Stossich's papers. So far as we can find in Stossich's papers he has not attempted to raise *Polyorchis* above the rank of a subgenus.

While not in a position to give a full account of the anatomy of this form, we have been able to make out definitely certain points of interest on Leidy's material, poorly preserved as it is.

The worm measures 5.25 mm. long by 1.5 mm. broad; its surface between the suckers is covered with numerous minute spines, regularly arranged (Pl. III., Fig. 2); the spines nearest the mouth are smaller than those nearer the acetabulum. The oral sucker is sub-terminal, 0.32 mm. in diameter. The acetabulum is about on the border of the first and second fourths of the body, about 0.88 mm. from the mouth. Genital pore could not be determined definitely, but as we saw a line of ova on the left of the acetabulum and an indistinct line on the right, we mistrust, from a comparison with Stossich's figure (Pl. III., Fig. 3) of *Distoma polyorchis*, that the genital pore will be found immediately in front of the acetabulum, and that the indistinct line on the right of the acetabulum represents the cirrus.

Of the digestive tract but little could be made out with certainty. A pharynx 0.24 mm. long was traced from the oral sucker; then came a very short pharyngeal bulb, 0.176 mm. in diameter; from here an œsophagus 0.88 mm. long was seen to extend caudad, and then branch into a right and left intestine, each of which branched again, sending one branch cephalad the other caudad. Of the male genital organs we could distinguish with certainty two longitudinal rows of testicles. In 1894 *b*, we stated that there were thirteen in each row, but in this we were in error. We can now distinguish with certainty fourteen testicles on the right side and fifteen on the left; at the posterior end of the right series is a slightly dark portion of tissue, which may possibly represent a fifteenth testicle for the right side, but the material is too poor to determine this with certainty. Cephalad to the testicles as described (14: 15) there is seen on the right side and extending partly over to the left side a very indistinct organ (vitello-reservoir? or ovary?), and partly covered by this on the left side an indistinct organ about the size of a testicle (shell-gland? ovary? or testicle?). Between the two longitudinal rows of testicles a fine canal (vas deferens? or more probably excretory canal) was seen. Of the female organs the vitellogene glands were very distinct; they begin at the height of the acetabulum, and run as two broad bands lateral of the rows of testicles to the

posterior end of the body ; the right longitudinal vitello-duct is here and there visible ; and a left transverse vitello-duct could be indistinctly made out. No organs could be definitely established as ovary, shell-gland, or vitello-reservoir. The walls of the uterus could not be distinguished, but the ova formed an index to its position ; extending from the uncertain organ in front of the testicles to the acetabulum, these ova were arranged for the most part irregularly, but here and there transversely in a single regular row ; they also extended (probably in the metatrem) around the left side of the acetabulum to a point immediately to the right of the median line.

Under ordinary circumstances we feel that an author would be totally unjustified in publishing as poor material as we have taken as the basis of this description ; however, as the material represents type-material of considerable theoretical importance, on account of its relation to Stossich's interesting form, we will perhaps be pardoned for bringing the specimens to the attention of other helminthologists.

The question as to the rights of *Polyorchis* to generic or sub-generic rank naturally arises. That the characters found in *D. (P.) polyorchis* and *D. (P.) molle* give these two forms sub-generic rank at least, can hardly be questioned. To give the forms generic rank is something of a temptation, and not wholly unjustified ; at the same time we would call attention to the fact that there is still considerable to learn in regard to the anatomical structure of these forms—the ovary of neither form, for instance, has been definitely made out. Thus while we should not be surprised to see *Polyorchis* eventually recognized as a well-established genus, we prefer at present to look upon it as a sub-genus.

We cannot, however, agree with Monticelli (1893) in placing such forms as *D. Richardii* and *D. cygnoides* in this subgenus, as these two species present an entirely different topography from *D. polyorchis* (the generic type). In regard to *D. formosum* Sonsino, 1890, we reserve opinion as we are not acquainted with the form or with any figure of it.

SUMMARY.

1. Leidy's *Monostomum molle* is a distome and is closely related to Stossich's *Distoma polyorchis*.

2. For Leidy's form we propose the following provisional

Specific diagnosis: *Distoma (Polyorchis) molle* (Leidy, 1856), S. & H., 1894. Body 5.25 mm. long by 1.5 mm. broad, from oral sucker to acetabulum covered with instable spines. Oral sucker sub-terminal, 0.32 mm. in diameter. Acetabulum 0.32 mm. in diameter, on border of first and second fourths of body, 1.3 mm. from anterior extremity. Genital pore probably immediately anterior to acetabulum. Excretory pore? *Male genitalia*: testicles in two longitudinal rows, 14 (or 15?) on the right, 15 (or 16?) on the left; a fine longitudinal canal (excretory canal? or vas deferens?) between the two rows of testicles; end portion of male canal probably passes cephalad on the right of the acetabulum. *Female genitalia*: vitellogene glands broad, extending from the height of the acetabulum caudad, in the lateral fields to posterior end of body; ovary?, shell-gland?, uterus confined to a small area immediately posterior to acetabulum, metatrem passing to the left of the acetabulum. Ova 48 μ .

Host.—Lungs of Musk-turtle or Stink-pot (*Aromochelys odorata* Latreille, [*Sternotherus odoratus*]), by Leidy.

Geographical Distribution.— —? — in U. S. A.

Types.—One specimen in Coll. Leidy, University of Pennsylvania; one in United States National Museum. Both types poorly preserved. None for exchange.

3. This form agrees with *D. (P.) polyorchis* Stossich from the intestine of a fish (*Corvina nigra*) in the following characters:

Body covered with spines from oral sucker to acetabulum; genital pore immediately anterior to acetabulum; pharynx and pharyngeal bulb present; intestine with anterior prolongations; testicles post-acetabular and arranged in two longitudinal rows; end portion of male canal at the right of acetabulum; metatrem runs left of acetabulum; vitellogene glands lateral, broad, extend from acetabulum to posterior end.

4. The difference between the two forms may be seen in the following table:

Host, a fish; acetabulum on border of second and third fourths of body;

oesophagus absent; testicles symmetrical, six pairs (or ¹ twelve pairs?);

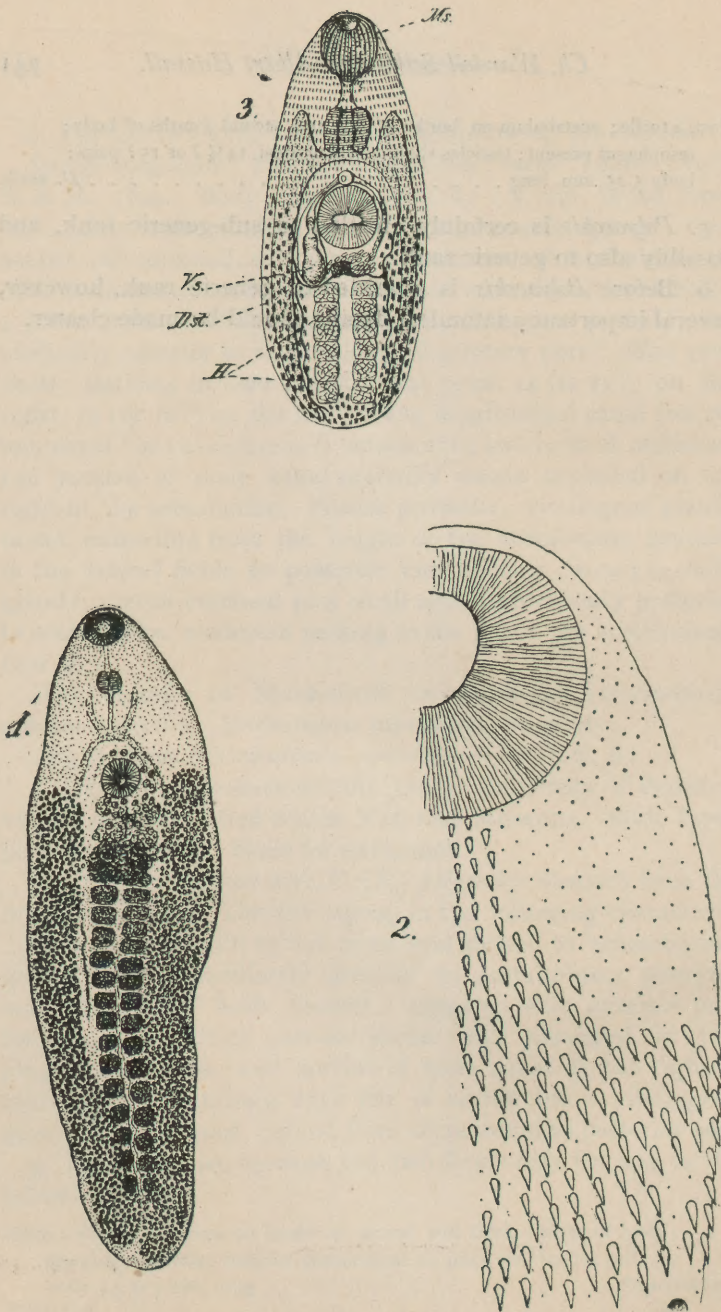
body 3.5–6.5 mm. long *D. polyorchis*.

¹ According to Stossich's figure (Plate XIV, Fig. 61), which has been copied by Braun, and which we reproduce on Plate III, there are twelve testicles present; according to his text (Brani di elmintologia tergestina; Bol. Soc. Adriat. di Sc. nat., xv, 1889, p. 24), on the other hand there are twenty-four testicles present.

Host, a turtle; acetabulum on border of first and second fourths of body;
oesophagus present; testicles slightly symmetrical, $14\frac{1}{2}$? or 15 ? pairs;
body 5.25 mm. long *D. molle*.

5. *Polyorchis* is certainly entitled to sub-generic rank, and possibly also to generic rank.

6. Before *Polyorchis* is admitted to generic rank, however, several important anatomical details should be made clearer.



DISTOMA (POLYORCHIS) MOLLE AND DISTOMA (POLYORCHIS) POLYORCHIS.

Fig. 1.—*D. (P.) mollis*; drawing from Leidy's type of *Monostomum mollis*. For description, vide specific diagnosis, p. 740.

Fig. 2.—Highly magnified anterior portion of same, showing oral sucker, and spines.

Fig. 3.—*D. (P.) polyorchis* after Stossich. V. s., vesicula seminalis; D. st., vitellogene glands; H., testes. Reduced.